

TECTONIC EVOLUTION AND RARE EARTH ELEMENTS POTENTIAL OF PRE AND SYN-OROGENIC HIMALAYAN CARBONATITES, NORTHWEST PAKISTAN

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Abstract

Carbonatite deposits are virtually thought to have been intruded in intraplate settings by anorogenic processes like rift zones (extensional environments), and are used to predict the information regarding chemical composition of the underlying mantle from where they originate. Carbonatites of Pakistan are uniquely important because they crop out in an orogenic collision zone, and hence contain both pre-orogenic and syn-orogenic plutons. From literature it is apparent that the younger Loe Shilman and Sillai Patti (30 Ma) and the older Koga and Jambil (300 Ma) duplicates the syn-orogenic and pre-orogenic carbonatites deposits of Pakistan, respectively. This study will focus on examining the petrographic attributes and its corresponding linkage with tectonic setting of the study area based on new major, trace and rare earth elements (REEs) data, and absolute dating based on modern petrochronological techniques. A concept of gravitational collapse within the recent Himalayas is proposed to be correlated with the evolution of these carbonatites during their genesis. Hence we will focus on the major tectonic events that occurred along the Main Mantle Thrust; where these outcrops overlay a triangular pattern of geography, representing its regional tectonic overview. Furthermore, the study will correlate the results with other carbonatite deposits and their tectonic genesis from round the world as limited data has been acquired from this part of Asian continent. Carbonatites have gained considerable economic significance because of their newly recognized importance in producing large-scale sources of niobium, cerium, apatite, magnetite, barite, vermiculite, phosphorus, tantalum, uranium, thorium, copper, iron, titanium, vanadium, barium, fluorine, zirconium, and other rare or incompatible elements. Apatite, barite and vermiculite meets the industry demands among these minerals associated with carbonatites. It is reputed that the economic importance of the REEs will contribute towards the development of the host country in broader future upon successful/profitable commercially approved results.